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Face Detection using Neural Network

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Abstract-

Face recognition has now become an important function of surveillance system, enabling detection and identification of person who appears in a frame. Face recognition from the real data, capture images, sensor images and database images is challenging problem due to the wide variation of face appearances, illumination effect and the complexity of the image background. With the development of deep learning, face recognition technology based on CNN (Convolutional Neural Network) has become the main method adopted in the field of face recognition.Face recognition can easily be achieved using deep learning sub-field like CNN model which requires less training and inspired by the visual cortex. It is a multi-layer network which is used to train the network, to perform a particular task using classification. This paper suggests a cascade classifier based face detection and CNN based face recognition that can recognize the faces.

Key words: Face recognition method, CNN, surveillance etc.

I.INTRODUCTION

Intelligent systems appear more and more in people's lives, and often need to be identified when using intelligent systems. Traditional methods of identification mainly identify individuals with some personal characteristics, such as identity documents, such as documents and keys, which have obvious

shortcomings. They are easily forgotten, lost or faked. If you use some of the personal characteristics to identify the effect will be quite good, such as: face recognition, fingerprinting and so on.

Face recognition is a very challenging research area in computer vision and pattern recognition due to variations in facial expressions, poses and illumination. Several emerging applications, from law enforcement to commercial tasks, demand the industry to develop efficient and automated face recognition systems.

Although, many researchers have worked on the problem of face recognition for many years still several challenges need to be solved. Difference in illumination of the scene, changes in pose, orientation and expression are examples of some of the issues to be dealt carefully. Also when size of face database increases the recognition time becomes a big constraint.

Face recognition is one of the biometric methods that to have the merits of both high accuracy and low intrusiveness. It has the accuracy of a physiological approach without being intrusive. For this reason, the face recognition has drawn the attention of researchers in fields from security, Psychology, and image processing, to computer vision. Many algorithms have been proposed for face recognition, Face recognition has also proven useful in other multimedia information processing areas. Facial recognition analyses the characteristics of a person's face images input through a digital video camera or online face capturing.

Now days we need to maintain global security Information, in every organization or individual wants to improve their existing security system. Most of the people need better security system which gives complete security solution.

II. METHODOLOGY

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other.

The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. While in primitive methods are hand-engineered, with enough training, ConvNets have the ability to learn these characteristics. The architecture of a ConvNet is analogous to that of the connectivity pattern of Neurons in the Human Brain and was inspired by the organization of the Visual Cortex.

III. PROPOSED SYSTEM

Face recognition is essentially pattern recognition, and the purpose is to abstract real things into numbers that computers can understand. If a picture is a 256 bit-colour image, then each pixel of the image is a value between 0 and 255, so we can convert an image into a matrix. How to identify the patterns in this matrix? One way is to use a relatively small matrix to sweep from left to right and top to bottom in this large matrix.

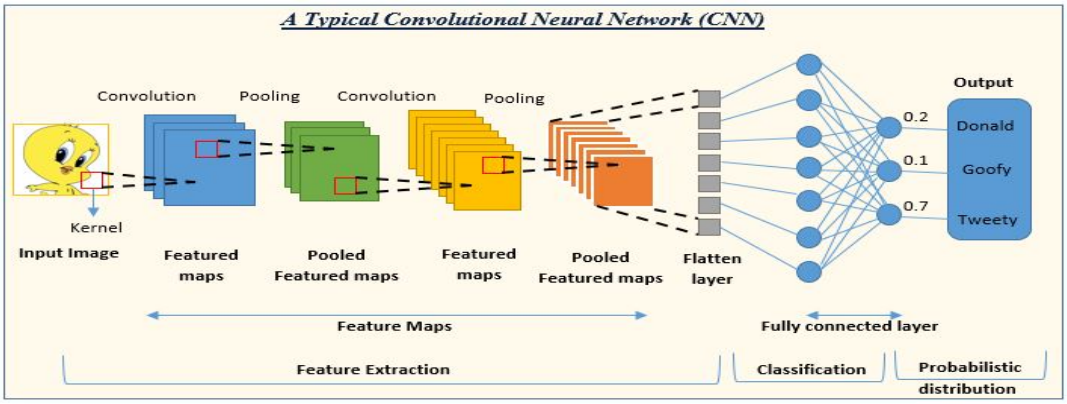


Fig 1. A Typical CNN

A typical CNN is shown in the figure1.

Within each small matrix block, we can count the number of occurrences of each colour from 0 to 255. So we can express the characteristics of this block.Through this scan, we get another matrix consisting of many small matrix block features. And this matrix is smaller than the original matrix. Then, for this smaller matrix, perform the above steps again to perform a feature concentration. In another sense, it is abstracted.

Finally, after many abstractions, we will turn the original matrix into a 1 dimension by 1 dimension matrix, which is a number. Different pictures, such as a cat, or a dog, a bear, will eventually get abstracted to different numbers.

Similarly, faces, expressions, ages, these principles are similar, but the initial sample size will be large, and ultimately the specific image is abstracted into numbers through the matrix.

Then by calculating the difference between the matrices, we can achieve the goal of comparing faces.

Fig 2. Loss Graph & Accuracy Graph

IV. EXPERIMENTAL RESULTS

The CNN is designed with 25 layers such as input layer, Convolution, ReLU, Cross Channel Normalization, Max Pooling, Convolution, ReLU, Cross Channel Normalization, Max Pooling,

Convolution, ReLU, Convolution, ReLU, Convolution, ReLU, Max Pooling, Fully Connected, ReLU, Dropout, Fully Connected, Softmax and Classification Product.

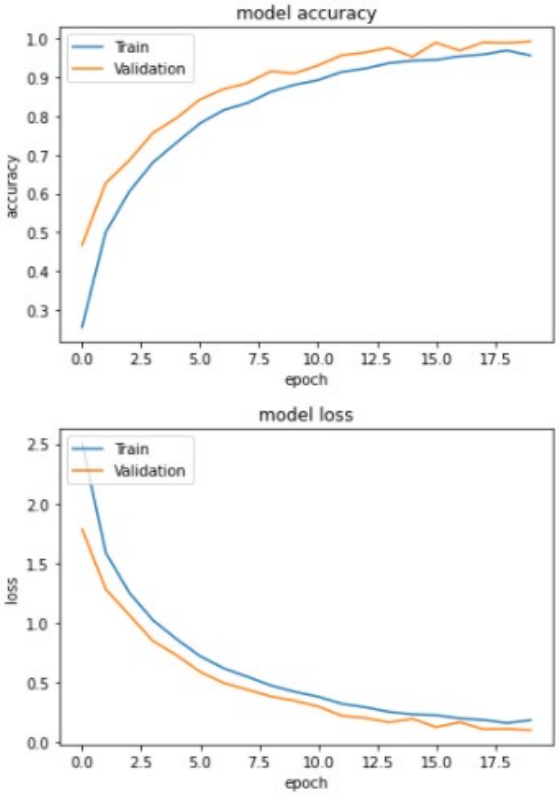
The face recognition can be performed by training images from data i.e., resize the images to 224*224 and transfer them to CNN layers to pre-process the trained data and then to softmax classiffier to obtain the characteristics of the subjects.

The results are shown in the figure2.

The review of proposed CNN architecture in terms of loss is near equals to 0 and accuracy reaches 100. Thus by note, the efficiency of the introduced algorithm is as desired.Loss & accuracy graphs are shown in the figure 2 below.**V. CONCLUSION**

Two new CNN architectures have been proposed. The first architecture handles frontal facial images under occlusions, various illumination and facial expressions. The second CNN architecture tackles facial images with various poses, facial expressions and illumination.

Z-score normalization and Gaussian weight initialization algorithm has been found to be the best combination that resulted in the highest accuracy. A classification accuracy of 99.50% and 85.13% are achieved on test samples for AR and FERET database respectively. On a 2.5 GHz Intel i5-3210M quad core processor and 8GB RAM memory, the recognition time taking less than 0.01 seconds is achieved.



For future work, the proposed architecture will be extended to improve the accuracy on FERET database and add in new algorithms to include new subjects.

VI. FUTURE WORK

Though the proposed model has achieved a commendable result, it needs some improvements in some areas like adding more data in each class in order to get more accurate result as it is known that deep learning is a datadriven approach.

In future work we can use eye cascade along with face cascade incase if full face is not visible due to some reasons then we can also recognize person by using eye cascade, In future by using Multi-task Cascade CNN (MTCNN) library. By using this we can detect multiple faces at a time.

We can also use neuro-fuzzy system by using IF-THEN fuzzy rules it will be easy to classify wether its about use of face/eye cascade or single or multiple face capture.

VII. REFERENCE

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